

BUMAX[®]

THE WORLD'S STRONGEST
STAINLESS STEEL BOLTS



FASTENING SOLUTIONS HIGH-TECH INDUSTRIES

BUMAX[®] Advanced Stainless Solutions

BUMAX high strength stainless steel fasteners, trusted by engineers for critical fastening applications in high-tech manufacturing industries.



Contact

sales.bumax@bumax.se

+46 10 478 4400

www.bumax-fasteners.com

BUMAX AB | Bultvägen 1 | 812 94 Åshammar | SWEDEN



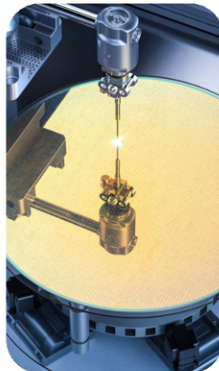


INTRODUCTION

High-tech industries face specific technical and commercial challenges, when it comes to reliable, high-performance fastening for critical applications. The majority of fasteners on the market are commodity products, resulting in fasteners with highly variable performance and quality. This makes it difficult for engineers to guarantee consistent performance in the final assembled product. BUMAX's high-performance stainless steel fastener products and its niche manufacturing capabilities makes it the ideal partner for high-tech industries.

MARKET SECTORS

- Semiconductor Manufacture
- Medical Equipment
- Space Systems
- Optical & Imaging Systems
- Vacuum Assemblies
- Electronics
- Communications Equipment



OUR SERVICES

BUMAX offers an extensive range of standard stock product grades, available direct and through leading distributors globally.

Our technical teams also work directly with OEM engineering, project and procurement teams, to support technically complex project requirements and customer specific fastener designs in BUMAX material grades.



BUMAX prides itself of being a 100% European traceable product from material to manufacture. This helps ensure the highest levels of quality and control on our fasteners.

BUMAX boasts industry leading technical expertise when it comes to material selection, corrosion and fastener manufacturing methods. This ensures BUMAX deliver both technically capable and commercial.viable solutions.



KEY CONSIDERATIONS

Corrosion resistance- equipment exposed to harsh conditions will need to resist corrosion and wear during their lifetime, minimizing ongoing maintenance, unexpected repairs and supporting maximum lifespan, given the high capital costs and critical operation of such equipment.

High strength- higher mechanical strengths allow engineers greater design flexibility. Higher strength can be utilized in several ways- ability to increase clamp forces in joints. This can be particularly useful in maintaining the joint integrity of airtight assemblies, vacuum equipment and high-pressure systems. Higher strength fasteners can also allow engineers to potentially downsize, not only the fasteners but potentially the connection as a whole. Such size and weight reductions at each connection interface, can potentially make a significant difference over a complete system.

Pre-load Accuracy (Friction)- when it comes to installation of fasteners, the ability to accurately tighten up fasteners and ensure clamp force in a joint is extremely important. Whether or not the installed fastener actually achieves the design clamp force, will depend largely on the accuracy of the friction coefficient and thread tolerances of the fasteners.

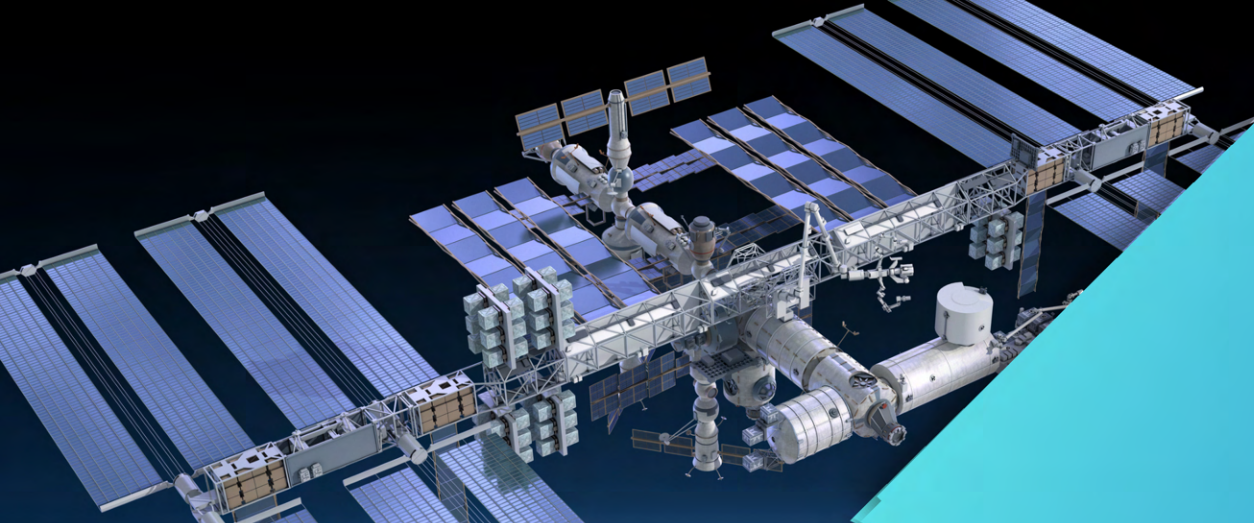
Galling- can be common challenge with poor quality stainless steel fasteners. Galling usually occurs in the threads or under head, as the fastener is tightened up. With commodity fasteners or cleaned and de-greased fasteners, galling can be difficult to control. This can result in insufficient pre-load/clamp force in the fastener, as much of the tightening torque will be lost to the effects of galling, instead of developing the correct clamp force in the joint.

Particle Emissions- are foreign objects that could make their way into sensitive equipment and disrupt their operational capability. When it comes to fasteners, these emissions could be small metal fragments, such as swarf or other contaminants, such as lubricants or chemicals used during the fastener production process or the fastener's packaging.

Outgassing- is due to undesirable contaminants in fasteners, that could disrupt the operation of sensitive equipment. Outgassing refers to elements within the material or some external contaminant e.g. lubricants that can become vaporized during operation. This type of situation can easily arise in environments that are subject to vacuum conditions or high temperatures. These vapours can then travel and condense over sensors and other sensitive electronic components, preventing their normal operation.

Product consistency- generic fastener products such as A2-70 or A4-80 are commodity products, insufficient for critical applications in high-tech industries. It difficult to maintain control over quality and performance of these fasteners. This makes installation accuracy challenging and increases the difficulty of guaranteeing performance and consistency of the final assembly. Add to this, a lack of transparency in the traceability of the fasteners and also consistent and reliable testing and certification available.

Special Requirements- fasteners for specialist applications in high-tech industries can often require special non-standard design features, additional surface treatments, cleaning operations and special packaging. This can increase the complexity and risk when these various operations have to be distributed across more companies within the supply chain.



BUMAX MATERIAL GRADES

BUMAX 88



- ✓ Premium Stainless Steel Hi-Mo A4/316L
- ✓ Tensile Strength min. 800 MPa
- ✓ Yield Strength min. 640 MPa
- ✓ Elongation min. 0.3d

Key Features- highly consistent performance, good fatigue performance, accurate torque-pre-load, excellent material performance down to -273°C

BUMAX 109

- ✓ Premium Stainless Steel Hi-Mo A4/316L
- ✓ Tensile Strength min. 1,000 MPa
- ✓ Yield Strength min. 900 MPa
- ✓ Elongation min. 0.2d

Key Features- high strength, highly consistent performance, accurate torque-pre-load, excellent material performance down to -273°C



BUMAX DX 129



- ✓ Duplex Stainless Steel 1.4462/S32205
- ✓ Tensile Strength min. 1,200 MPa
- ✓ Yield Strength min. 1,080 MPa
- ✓ Elongation min. 0.3d

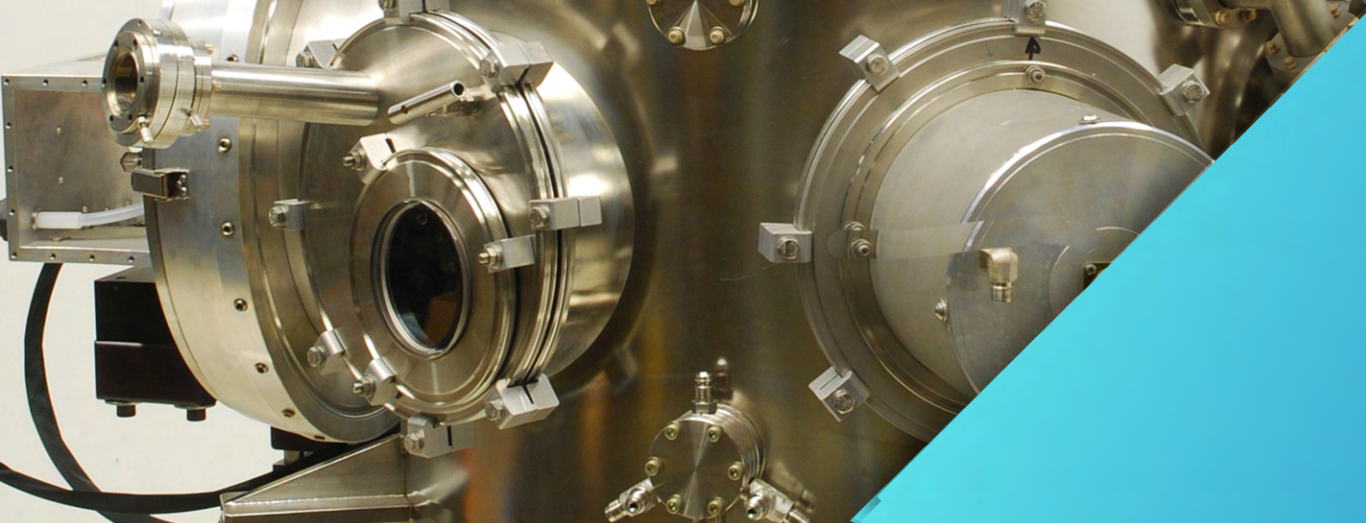
Key Features- very high strength (even up to eqv. 14.9 is possible in certain cases), high corrosion resistance, excellent ductility, high fatigue performance, potential alternative to coated 12.9 carbon steel, Titanium and Nickel alloy fasteners

BUMAX ULTRA 159

- ✓ Super High Strength Precipitation Hardened Stainless Steel
- ✓ Tensile Strength min. 1,500 MPa
- ✓ Yield Strength min. 1,350 MPa

Key Features- super high strength, diameters M3 - M12, reasonable corrosion resistance, temperature resistance to around 400°C





BUMAX STANDARD FASTENER TYPES

BUMAX stocks an extensive range of standard fasteners in BUMAX 88, BUMAX 109, DX 129 and SDX 109 material grades. Stock sizes range from M3 upto M36 in diameter, dependent on the material grade.

Fastener types include hex head bolts (ISO 4014), hex set screws (ISO 4017), socket cap screws (ISO 4762), socket counter-sunk screws (ISO 10642), torx pan head screws (ISO 14583), studs (DIN 938 / 976), nuts (ISO 4032), lock nuts and washers (ISO 7089).

BUMAX CUSTOM/SPECIAL FASTENER TYPES

Standard fastener products outside of the stock size ranges detailed above, can be manufactured to order. Special fastener types and also customer specific designs, can also be manufactured to order.

Typical Manufacturing Capability		
BUMAX 88	M3 - M36	No. 5 - 1 3/8"
BUMAX 109	M3 - M24	No. 5 - 1"
DX 129	M3 - M20	No. 5 - 3/4"
SDX 109	M3 - M24	No.5 - 1"

Contact your local BUMAX sales engineer, technical team or authorised BUMAX distributor for more information and to verify any special technical requirements.

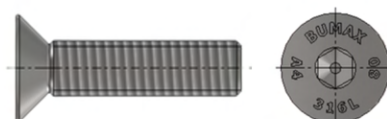
ISO 4762 Socket Cap Head



Material Grades: BUMAX 88 M3 - M36
BUMAX 109 M3 - M20
DX 129 M3 - M20
SDX 109 M3 - M24

Special Variants: Vented

ISO 10642 Socket Counter-Sunk Screw



Material Grades: BUMAX 88 M3 - M20
BUMAX 109 M3 - M16
DX 129 M3 - M20
SDX 109 M3 - M16

Special Variants: Vented

DIN 7964-KE Captive Socket Head Cap Screw



Material Grades: BUMAX 88 M3 - M36
BUMAX 109 M3 - M20
DX 129 M3 - M20
SDX 109 M3 - M24

Special Variants: Vented

Manufactured to Order

DIN 7984

Low Head Socket Cap Screw



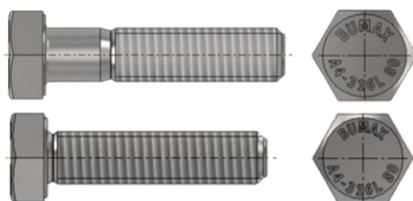
Material Grades:	BUMAX 88	M3 - M20
	BUMAX 109	-
	DX 129	-
	SDX 109	-

Special Variants: Vented

Manufactured to Order

ISO 4014 / 4017

Hex Head Bolt / Screw



Material Grades:	BUMAX 88	M3 - M36
	BUMAX 109	M3 - M20
	DX 129	M3 - M20
	SDX 109	M3 - M24

Special Variants: Vented

DIN 938

Double Ended Stud



Material Grades:	BUMAX 88	M6 - M20
	BUMAX 109	-
	DX 129	-
	SDX 109	-

Special Variants: Vented

DIN 976

Fully Threaded Stud



Material Grades:	BUMAX 88	M5 - M36
	BUMAX 109	-
	DX 129	-
	SDX 109	-

Special Variants:

ISO 14583-TT

Hexalobular Socket Pan Head

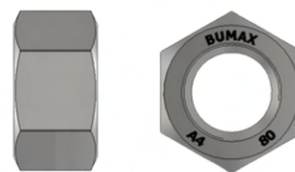


Material Grades:	BUMAX 88	M3 - M36
	BUMAX 109	M3 - M16
	DX 129	M3 - M20
	SDX 109	M3 - M20

Special Variants: Vented

ISO 4032

Hex Nut

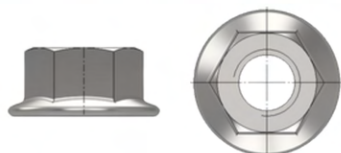


Material Grades:	BUMAX 88	M3 - M36
	BUMAX 109	M3 - M16
	DX 129	M3 - M20
	SDX 109	M3 - M20

Special Variants: Vented

BUMAX Lock

Full Metal Locking Nut

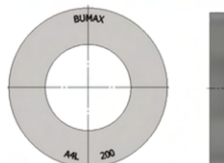


Material Grades:	BUMAX 88	M3 - M36
	BUMAX 109	M3 - M16
	DX 129	M3 - M20
	SDX 109	M3 - M20

Special Variants: Vented

ISO 7089

Plain Washer

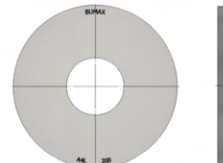


Material Grades:	BUMAX 88	M3 - M36
	BUMAX 109	M3 - M16
	DX 129	M3 - M20
	SDX 109	M3 - M20

Special Variants: Vented

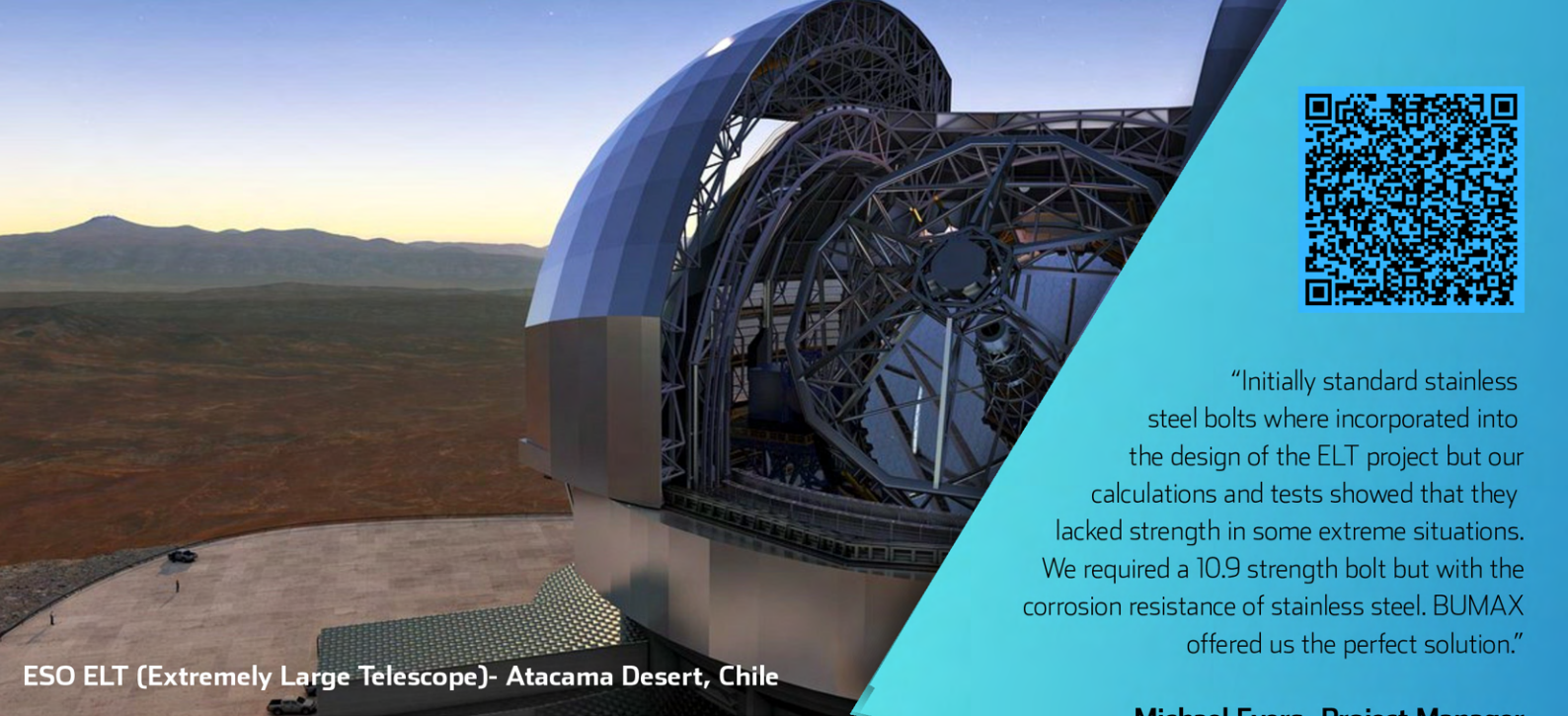
ISO 7093

Large Series Washer



Material Grades:	BUMAX 88	M3 - M36
	BUMAX 109	M3 - M16
	DX 129	M3 - M20
	SDX 109	M3 - M20

Special Variants: Vented



ESO ELT (Extremely Large Telescope)- Atacama Desert, Chile

“Initially standard stainless steel bolts were incorporated into the design of the ELT project but our calculations and tests showed that they lacked strength in some extreme situations. We required a 10.9 strength bolt but with the corrosion resistance of stainless steel. BUMAX offered us the perfect solution.”

**Michael Evers- Project Manager
(VDL ETG)**



CUSTOMER CASE STUDY

Dutch company VDL ETG Projects built the supporting structure for the main mirror of the ESO ELT telescope in Chile. At an elevation of over 3,000m in the Atacama Desert, the ELT will enable new scientific discoveries related to planets, the composition of nearby galaxies and the deep universe.

Over 11,000 BUMAX fasteners were used to fix the telescope mirrors to their segment supports. A total of twelve BUMAX 109 M6 x 10 were used to fasten each of the 931 segments. The BUMAX 109 bolts were a special customized design used specifically for this project, with an additional Dicronite® coating to minimize any risk of friction.



TRACEABILITY, TESTING & CERTIFICATION

BUMAX products are 100% European traceable, both material and manufacture.

Every batch of BUMAX fasteners manufactured undergoes strict quality control processes and full mechanical testing in accordance with ISO 3506-1.

3.1 product test certificate are available on all BUMAX products, in accordance with EN 10204.



- ✓ Fastener Tensile Strength
- ✓ Chemical Composition
- ✓ Fastener Yield Strength
- ✓ Material Reference #
- ✓ Elongation on Fracture
- ✓ Production Reference #

Custom specific testing can also be carried out and included on the 3.1 certificates, based on customer requirements. Material and production reference numbers for every production batch are included on BUMAX’s box labels which can be cross referenced to the 3.1 test certificates for traceability.



BUMAX[®]

THE WORLD'S STRONGEST
STAINLESS STEEL BOLTS



sales.bumax@bumax.se



+46 10 478 4400



www.bumax-fasteners.com



BUMAX AB | Bultvägen 1 | 812 94 Åshammar | SWEDEN